TROUBLE SHOOTING GUIDE

for

SUNNEN® AUTOMATIC VERTICAL HONING MACHINE
(FOR AUTOMOTIVE & INDUSTRIAL APPLICATIONS)
Model CV-616

READ THE FOLLOWING INSTRUCTIONS THOROUGHLY AND CAREFULLY BEFORE UNPACKING, INSPECTING, OR INSTALLING THE SUNNEN® AUTOMATIC VERTICAL HONING MACHINE.

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SUNNEN® PRODUCTS COMPANY • 7910 MANCHESTER AVENUE • ST. LOUIS, MO 63143, U.S.A. • PHONE: 314-781-2100
GENERAL INFORMATION

The Sunnen® equipment has been designed and engineered for a wide variety of parts within the capacity and limitation of the equipment. With proper care and maintenance this equipment will give years of service.

READ THE FOLLOWING INSTRUCTIONS CAREFULLY AND THOROUGHLY BEFORE UNPACKING, INSPECTING, OR INSTALLING THIS EQUIPMENT. IMPORTANT: Read any supplemental instructions BEFORE installing this equipment. These supplemental instructions give you important information to assist you with the planning and installation of your Sunnen equipment.

Sunnen Technical Service Department is available to provide telephone assistance for installation, programming, & troubleshooting of your Sunnen equipment. All support is available during normal business hours, 8:00 AM to 4:30 PM Central Time.

Review all literature provided with your Sunnen equipment. This literature provides valuable information for proper installation, operation, and maintenance of your equipment. Troubleshooting information can also be found within the Instructions. If you cannot find what you need, call for technical support.

Where applicable, programming information for your Sunnen equipment is also included. Most answers can be found in the literature packaged with your equipment.

Help us help you. When ordering parts, requesting information, or technical assistance about your equipment, please have the following information available:

- Have ALL MANUALS on hand. The Customer Services Representative or Technician will refer to it.
- Have Model Number and Serial Number printed on your equipment Specification Nameplate.
- Where Applicable: Have Drive model and all nameplate data. Motor type, brand. and all nameplate data.

For Troubleshooting, additional information may be required:

- Power distribution information (type - delta, wye, power factor correction; other major switching devices used, voltage fluctuations)
- Installation Wiring (separation of power & control wire; wire type/class used, distance between drive and motor, grounding).
- Use of any optional devices/equipment between the Drive & motor (output chokes, etc.).

For fast service on your orders call:
Sunnen Automotive Customer Service toll free at: 1-800-772-2878
Sunnen Industrial Customer Service toll free at: 1-800-325-3670
Customers outside the USA, contact your local authorized Sunnen Distributor.
Additional information available at: http://www.sunnen.com or e-mail: sunnen@sunnen.com

NOTE: Sunnen reserves the right to change or revise specifications and product design in connection with any feature of our products contained herein. Such changes do not entitle the buyer to corresponding changes, improvements, additions, or replacements for equipment supplies or accessories previously sold. Information contained herein is considered to be accurate based on available information at the time of printing. Should any discrepancy of information arise, Sunnen recommends that user verify the discrepancy with Sunnen before proceeding.

ESD PREVENTION REVIEW

Let's review the basics of a sound static control system and its effective implementation. First, in the three step plan:

1. Always ground yourself when handling sensitive components or assemblies.
2. Always use a conductive or shielded container during storage or transportation. These materials create a Faraday cage which will isolate the contents from static charges.
3. Open ESD safe containers only at a static safe work station.

At the static safe work station, follow these procedures before beginning any work:

A. Put on your wrist strap or foot grounding devices.
B. Check all grounding cords to make sure they are properly connected to ground. ensuring the effective dissipation of static charges.
C. Make sure that your work surface is clean and clear of unnecessary materials, particularly common plastics.
D. Anti-static bubble wrap has been included for use at the machine when an ESD safe workstation is not available.

You are now properly grounded and ready to begin work. Following these few simple rules and using a little common sense will go a long way toward helping you and your company in the battle against the hazards of static electricity. When you are working with ESD sensitive devices, make sure you:

GROUND
ISOLATE
NEUTRALIZE
SUNNEN® LIMITED PRODUCT WARRANTY

Sunnen® Products Company and its subsidiaries (SPC) warrant that all new SPC honing machines, gaging equipment, tooling, and related equipment will be free of defects in material and/or workmanship for a period of one year from the date of original shipment from SPC.

Upon prompt notification of a defect during the one-year period, SPC will repair, replace, or refund the purchase price, with respect to parts that prove to be defective (as defined above). Any equipment or tooling which is found to be defective from improper use will be returned at the customer’s cost or repaired (if possible) at customer’s request. Customer shall be charged current rates for all such repair.

Prior to returning any SPC product, an authorization (RMA#) and shipping instructions must be obtained from the Customer Service Department or items sent to SPC will be returned to the customer.

Warranty Limitations and Exclusions: This Warranty does not apply to the following:

- Normal maintenance items subject to wear and tear: (belts, fuses, filters, etc).
- Damages resulting from but not limited to:
  - Shipment to the customer (for items delivered to customer or customer’s agent F.O.B., Shipping Point)
  - Incorrect installation including improper lifting, dropping and/or placement
  - Incorrect electric power (beyond +/- 10% of rated voltage) including intermittent or random voltage spikes or drops
  - Incorrect air supply volume and/or pressure and/or contaminated air supply
  - Electromagnetic or radio frequency interference from surrounding equipment (EMI, RFI)
  - Storm, lightning, flood or fire damage
  - Failure to perform regular maintenance as outlined in SPC manuals
  - Improper machine setup or operation causing a crash to occur
  - Misapplication of the equipment
  - Use of non-SPC machines, tooling, abrasive, fastening, coolant, repair parts, or filtration
  - Incorrect software installation and/or misuse
  - Non-authorized customer installed electronics and/or software
  - Customer modifications to SPC software

THE LIMITED WARRANTY DESCRIBED HEREIN IS EXPRESSLY IN LIEU OF ANY OTHER WARRANTIES. SPC MAKES NO REPRESENTATION OR WARRANTY OF ANY OTHER KIND, EXPRESS OR IMPLIED, WHETHER AS TO MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR ANY OTHER MATTER. SPC IS NOT RESPONSIBLE FOR THE IMPROPER USE OF ANY OF ITS PRODUCTS. SPC SHALL NOT BE LIABLE FOR DIRECT, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES INCLUDING BUT NOT LIMITED TO: LOSS OF USE, REVENUE, OR PROFIT. SPC ASSUMES NO LIABILITY FOR PURCHASED ITEMS PRODUCED BY OTHER MANUFACTURERS WHO EXTEND SEPARATE WARRANTIES. REGARDLESS OF ANY RIGHTS AFFORDED BY LAW TO BUYER, SPC’S LIABILITY, IF ANY, FOR ANY AND ALL CLAIMS FOR LOSS OR DAMAGES WITH RESPECT TO THE PRODUCTS, AND BUYER’S SOLE AND EXCLUSIVE REMEDY THEREFORE, SHALL IN ALL EVENTS BE LIMITED IN AMOUNT TO THE PURCHASE PRICE OF THAT PORTION OF THE PRODUCTS WITH RESPECT TO WHICH A VALID CLAIM IS MADE.

Shipping Damages

Except in the case of F.O.B. Buyer’s destination shipments, SPC will not be liable for any settlement claims for obvious and/or concealed shipping damages. The customer bears the responsibility to unpack all shipments immediately and inspect for damage. If, however, concealed damage is found, the customer must immediately notify the carrier’s agent to make an inspection and file a claim. The customer should return the shipping container and packing material.

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Any alteration or reverse engineering of the software is expressly forbidden and is in violation of this agreement.

SPC reserves the right to update the software covered by this agreement at any time without prior notice and any such updates are covered by this agreement.
SAFETY INSTRUCTIONS
READ FIRST

This machine, like any equipment, may be dangerous if used improperly. Please read all warnings and instructions before attempting to use this machine.

Always disconnect power at main enclosure before servicing machine.¹

Always wear eye protection when operating this machine.

NEVER open or remove any machine cover or protective guard with power "ON."
Always disconnect power at main enclosure before servicing this equipment.¹

DO NOT attempt any repair or maintenance procedure beyond those described in this book. Contact your Sunnen® Field Service Engineer or Technical Services Representative for repairs not covered in these instructions.

Due to the wide variety of machine configurations, all possibilities cannot be described in these instructions. Instructions for safe use and maintenance of optional equipment ordered through Sunnen, will be provided through separate documentation and/or training provided by your Sunnen Field Service Engineer or Technical Services Representative.

DO NOT attempt to defeat any safety device on this machine or on any of the optional equipment.

If specially built automation components are added to this system, be sure that safety is not compromised. If necessary, obtain special enlarged work area safety system from Sunnen Products Co.

CEF Indicates CE version ONLY.

¹ DO NOT touch electrical components until main input power has been turned off and CHARGE lamps are extinguished. WARNING: The capacitors are still charged and can be quite dangerous.
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* Not applicable to all models.
SECTION 1
GENERAL DESCRIPTION

GENERAL
Identification Of Controls And Components Of The Sunnen Automatic Vertical Honing Machine
1. DRIVE ARM -the stroking and rotational motion.
2. CLUTCH CONTROL LEVER (START LEVER) -push back to start motors; pull forward to engage drive.
3. "MOTOR ON" INDICATOR LIGHT (Red) - indicates all motors on.
4. FEED HANDWHEEL -feeds out or retracts stones in Hone Tool.
5. FEED -indicates amount of stone feed-out, and controls honing cycle.
6. FEED INDEX PLATE - calibrates each graduation on Feed Dial according to tooling being used.
7. DRIVE TUBE -transmits the rotation and stroking motion from the Drive Arm to the Hone Tool.
8. LEVER (DRIVE ARM CONTROL LEVER) - lowers the Hone Tool into the bore to be honed.
9. OIL -directs flow of honing oil. (Various length oil spouts have been supplied.)
10. OIL SHUTOFF VALVE -regulates flow of honing oil.
11. TRAVERSE HANDWHEEL -moves the Carriage and Drive Arm sideways.
12. ELEVATING CRANK -vertically positions the workpiece placed on the cradle.
13. REMOTE CONTROL STATION -houses controls.
14. LOAD METER -indicates stone cutting action.
15. STROKE BOTTOM LIGHT (Amber) -indicates when Hone is at the bottom of the stroke.
16. DWELL TIMER (MULTIPLE DWELL CONTROL) -provides a predetermined number of dwell cycles automatically.
17. STOP PUSH BUTTON (EMERGENCY STOP) -stops the Drive Motor, Pump Motor, and Blower Motor at any time during the honing cycle.
18. DWELL SELECTOR PUSH BUTTON (DWELL CONTROL) -provides a single dwell cycle when button is depressed; provides continuous dwell cycles for blind holes when outer ring is rotated.
19. ELECTRICAL CONTROL -contains electrical controls and main switch.
20. LEVELING SCREW -used to level machine.
21. CRADLE -provides the mounting for the workpiece fixturing.
22. INDEX LATCH -is used to position the workpiece in the correct angular position.
23. CLAMPS -are used to hold fixturing. (Optional not included with machine.)
24. FILTER CANISTERS.
25. COVER CLAMPS.
26. COVERS.
27. AIR VENTS.
28. FILTER ELEMENT STORAGE AREA.
29. DRAINCOCKS.
30. STANDPIPES.
31. SAFETY GUARD.

NOTE: Names of some components may vary from previously printed publications. Identify components from Figure 1.
SECTION 2
TROUBLESHOOTING

GENERAL
Consult the follow procedures when trouble shooting your machine.

WARNING
Troubleshooting electrical components is a job for a qualified electrician; therefore, instructions are no more detailed than needed by such a qualified person. If you don't know how to perform the checks required, do not attempt to troubleshoot an electrical system.

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PROBLEM
Motors do not start when CLUTCH CONTROL LEVER is pushed back.

TROUBLESHOOT
Push Clutch Control Lever and watch "MOTOR ON" light.

LIGHT ON,
but goes out when Lever is Released.

CHECK:
1. Motor Overloads tripped. Reset by pressing white Reset Button (see Figure 2-1).
2. Auxiliary Contact 1M2 is defective; replace (see Figure 2-2).
3. Motor Starter is defective; replace (refer to Figure 2-1).
4. Loose connections at Terminal 2, 3, 4, 13, 14, X1, or X2, or wires attached to these terminals are broken; correct by securing wires properly (refer to Figure 2-2).
5. L3 (1FU) fuse is blown; replace (refer to Figure 2-1).

LIGHT OFF

CHECK:
1. Disconnect Switch "OFF" (turn on).
2. FEED HANDWHEEL in "OFF" position (between 2.08 mm and 0).
3. LIFT LEVER not lowered (lower Hone Tool into normal working position inside the workpiece).
4. Lift Lever Safety Switch 8LS not adjusted properly or defective (see Page 18).
5. CLUTCH CONTROL LEVER not contacting Start Switch (refer to Clutch Mechanism Adjustment, Page 25).
6. 1FU Fuse blown (see Figure 2-1).
   NOTE: There are three 1FU Fuses, only one of which is likely to be blown . . . replace only the blown fuse.
7. 2FU Fuse blown (refer to Figure 2-1).
8. Transformer (refer to Figure 2-1) supplying control voltage is disconnected, improperly connected, or burned out. Reconnect properly or replace . . . see wiring diagram on transformer and machine Wiring Diagram supplied with machine for proper connections.
9. Loose connections at Terminals 1, 2, 3, 4, 11, 15, X1 or X2 (see Figure 2-2) or wires attached to these terminals broken . . . correct by securing wires properly.

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FIGURE 2-1, Electrical Enclosure
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NOTE: FOR REFERENCE ONLY; USE WIRING DIAGRAM SENT YOUR MACHINE.

FIGURE 2-2, Wiring Diagram
PROBLEM
Machine fails to dwell properly.

CHECK:
1. Leads or connections associated with Dwell Timer TM or Terminals 11, 9, or 4 defective; reconnect properly.
2. Defective contacts on clock motor (replace Dwell Timer TM)

CHECK:
1. Dwell Selector PUSH BUTTON defective; replace.
2. Auxiliary Contact 1M3 defective; replace (refer to Figure 2-3).
3. Loose connection at Terminal 11, 8, 16, 4, 9, 5, 6, or 10; or wires attached to these terminals broken... correct by securing wires properly (refer to Figure 2-3).

CHECK:
1. Dwell Selector PUSH BUTTON defective; replace.

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TROUBLE SHOOT
1. Stop Motors.
2. Remove flat drive belt.
3. Shut off or divert oil.
4. Start motors.
5. Manually rotate hone tool to position it at mid-stroke so Actuating Arm is not touching switches (see Figure 2-4).
6. Push Dwell Selector PUSH BUTTON for single dwell.

2CR Relay pulls in but drops out when Button is released (refer to Figure 2-3).

2CR Relay pulls in and performs normally (refer to Figure 2-3).

2CR Relay does not pull in (refer to Figure 2-3).
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3 PHASE

NOTE: FOR REFERENCE ONLY; USE WIRING DIAGRAM SENT YOUR MACHINE.

FIGURE 2-3, Wiring Diagram
CHECK:
1. 2CR1 Contact on 2CR Relay defective; replace 2CR Relay (refer to Figure 2-3).
3. Leads or connections associated with Terminals 11, 7, 8, 16, or 4 defective; reconnect properly.

CHECK:
1. Dwell SELECTOR Switch 2PB defective; replace (refer to Figure 2-3).
2. Auxiliary Contact 1M3 defective; replace.
3. 2CR Relay defective; replace.
4. Leads or connections associated with Terminals 11, 8, 16, or 4 defective; reconnect properly.

TROUBLE SHOOT
1. Rotate spindle to cause DRIVE ARM to make one Stroking Cycle. Observe operation of 1CR Relay / and listen for the snap of 1SOL Solenoid (6LS Switch closing) at the rear of the stroking arm just forward of the motor (see Figure 2-5).

CHECK:
1. 1CR Relay does not pull in; replace.
2. 6LS Switch not closing . . . refer to Solenoid Energize (One Way Roller) Switch Adjustment, Page 15. If Switch is defective; replace (refer to Figure 2-5).
3. Spring on One Way Roller Cam Operator on 6LS Switch broken. Replace Spring (refer to Figure 2-5).
4. Solenoid 1SOL coil burned out; replace solenoid.
5. Solenoid plunger burrred or otherwise not free to move; remove obstruction or replace Solenoid.
6. Leads or connections associated with Terminals 9, 5, 4, 6, 10, 11 defective; reconnect properly.

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TROUBLE SHOOT
1. If Solenoid pulls in properly, rotate spindle to cycle DRIVE ARM. Release Limit Switch 3LS (Figure 4) should open and permit 1CR Relay to open, followed immediately by 2CR and 1SOL. If not, proceed with checks.

CHECK:
2. Adjust Stroking Rocker Clearance (refer to Stroking Rocker Clearance Adjustment, Page 14).

FIGURE 2-4, Actuating Arm

FIGURE 2-5, Solenoid Switch
PROBLEM
Hone Tool stays in bottom of hole during dwell and won't come out.

CHECK:
1. Rocker Stop Cushion Adjustment (see Page 14).
2. Stroking Rocker Clearance Adjustment (refer to page 14).

TROUBLE SHOOT
1. Stop motors.
2. Remove flat drive belt.
3. Start motors.
4. Push DWELL SELECTOR PUSH BUTTON.
5. Manually rotate hone tool until machine goes into dwell.
6. Manually trip Solenoid Release Switch (see Figure 2-6).

Solenoid Plunger retracts (see Figure 2-7).

Solenoid Plunger does not retract (see Figure 2-7).

CHECK:
1. Solenoid Energize Switch 6LS Adjustment (see Page 15).

CHECK:
1. Binding Solenoid Plunger (see Figure 2-8).
2. Solenoid Release Switch 3LS defective (see Page 16).

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FIGURE 2-6, Solenoid Switch

FIGURE 2-7, Actuating Arm

FIGURE 2-8, Solenoid Plunger
PROBLEM
Machine continues to dwell on every other stroke. (Normal operation for continuous dwell mode.)

CHECK:
1. DWELL SELECTOR PUSH BUTTON outer ring turned to CONT.
2. Loose connections at 4, 9, (see Figure 2-9).
3. DWELL SELECTOR PUSH BUTTON defective.
4. Relay 2CR defective, contacts will not open; Replace.
5. DWELL TIMER Cams improperly set (see Page 26).

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PROBLEM
Machine "slams" or "bounces" during or after dwelling.

CHECK:
1. Rocker Stop Cushion Adjustment (see Page 14).
2. Stroking Rocker Clearance Adjustment (refer to Page 14).
3. Honing load very light. Add weights (refer to IOM Instructions packaged with your machine).

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FIGURE 2-9, Wiring Diagram
PROBLEM
Hone head chatters.

CHECK:
1. Main guide shims.
2. Timing belt loose or teeth missing.
3. Setting Gage Calibration (see Page 27).
4. Loose Universal Ring (see Figure 2-10). (The four Screws in ring should be tight.)

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FIGURE 2-10, Hone Head

FIGURE 2-11, Handwheel
PROBLEM
Stones do not feed out.

TROUBLE SHOOT
1. Stop motors.
2. Try Stone Shims.

SHIM FITS
Wedge was at end of travels.

SHIM DOES NOT FIT

TROUBLE SHOOT
Manually advance FEED HANDWHEEL while watching stones.

Stones Expand

Stone Do Not Expand

CHECK:
1. FEED HANDWHEEL set screw loose (see Figure 2-11).
2. Planetary Gears broken (see Page 19).
3. Broken feed rod.

TROUBLE SHOOT
With machine in operation, check that Feed Pawls at rear of Feed Handwheel move.

Pawls are not moving.

CHECK:
1. Feed setting less than 1 or Variable Feed Ratchet Adjustment incorrect (see Page 23).
2. Feed Overload Spring Adjustment (see Page 24).
3. Feed Push Rod Connection (see Page 22).

Pawls are moving.

CHECK:
1. Clutch Mechanism Adjustment (see Page 25).
2. Pawl Spring missing or broken.
PROBLEM
Machine does not shut off.

When FEED HANDWHEEL reaches zero.
CHECK:
1. Feed Handwheel Limit Switch Arm adjustment (see Page 24).
2. Defective Limit Switch.
3. Auto Cycle Stop Switch Adjustment (see Page 25).

When STOP PUSH BUTTON is pushed.
CHECK:
1. Defective STOP PUSH BUTTON Switch.
2. Defective motor starter (see Figure 2-12).

When FEED HANDWHEEL reaches zero & when STOP PUSH BUTTON is pushed.
CHECK:
2. Defective Motor Start Switch 2LS.

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PROBLEM
Machine "knocks" at end of each stroke.

CHECK:
1. Very high load - use softer stones.
2. Excessive carriage shoe clearance (see Page 18).
4. Loose or damaged Stroking Linkage.

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FIGURE 2-12, Electrical Enclosure
PROBLEM
"MOTOR ON" INDICATOR LIGHT does not burn when motors are running.

CHECK:
1. Defective bulb.
2. Loose connection at 3 or 4 (see Figure 2-13).

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FIGURE 2-13, Wiring Diagram
PROBLEM
STROKE BOTTOM LIGHT (Amber).

Does not light at bottom of Stroke.

CHECK:
STROKE BOTTOM LIGHT (Amber) Adjustment (see Page 17).

Does not light at all.

CHECK:
1. Defective bulb.
2. STROKE BOTTOM LIGHT (Amber) Adjustment (see Page 17).
3. Loose connection at 15, 12, or 4 (refer to Figure 2-13).
4. Defective STROKE BOTTOM LIGHT SWITCH (see Figure 2-14).

Light burns all the time.

CHECK:
1. STROKE BOTTOM LIGHT (Amber) Adjustment (see Page 17).
2. Defective STROKE BOTTOM LIGHT SWITCH (see Figure 2-14).

WARNING
Troubleshooting electrical components is a job for a qualified electrician; therefore, instructions are no more detailed than needed by such a qualified person. If you don’t know how to perform the checks required, do not attempt to troubleshoot an electrical system.

FIGURE 2-14, Light Switch
SECTION 3
MAINTENANCE

GENERAL
The following adjustment procedures are given as
guides only and are not to be construed as absolute
or invariable. Local conditions must always be
considered. Each machine must be maintained
individually according to its particular requirements.

ROCKER STOP CUSHION
To adjust Rocker Stop Cushion, proceed as follows:
(For location of Rocker Stop Cushion refer to
Figure 3-1.)

TO CHECK:
Measure the distance between the Tension Screw
and the body as shown in Figure 3-2. The distance
should be 1/16in. (1,5 mm).

TO ADJUST:
Insert (4 or 5 mm) pin in Cross Hole and turn
Tension Screw in or out until the gap is 1/16in.
(1,5mm).

STROKING ROCKER CLEARANCE
To adjust Stroking Rocker Clearance, proceed as
follows: (Stroking Rocker is located above and to
the right of the Stroke Length scale as shown in
Figure 3-3).

NOTE: Always check Rocker Stop Cushion
Adjustment before setting Rocker Clearance.

CAUTION
Make sure all power is OFF. Take care to prevent
pinching fingers in the various mechanisms
surrounding the Stroke Length Scale.

TO CHECK:
1. Get a .002in. (0,05 mm) feeler gage and a
combination of feeler gages that totaling .005in.
(13mm).

2. With drive arm in locked down position, rotate
drive tube by hand until arm is near bottom of its
travel.
3. Reach above and behind stroke length adjustment mechanism with your left hand and place the combination of feeler gages totaling .005 in. (13 mm) against Rocker Stop (see Figure 3-4).

4. While holding feeler gages against Rocker Stop, to locate the position where the Stroking Rocker clearance is minimum. Rotate drive tube with your right hand; and rocking drive arm over bottom dead center position.

5. If clearance is not between and .002 and .005 in. (0.5 - 13 mm) at its minimum position, adjust Setscrew in Stroking Rocker (refer to Figure 3-4).

**TO ADJUST:**

1. Get a ¼ in. or a 19 mm end wrench or box wrench and a ¼ in. a hex key wrench.

2. Loosen Locknut. (The is easily reached when the drive arm is near the top of its travel.)

3. With the Locknut loose, return the drive arm to the bottom of its stroke by rotating the drive tube. Turn Set Screw in or out while rocking the arm past bottom dead center until the clearance is correct. When the clearance is correct, raise the head by turning the drive tube and tighten the Locknut.

4. Check the clearance after tightening the Locknut.

**SOLENOID ENERGIZE SWITCH**

To adjust Solenoid Energize Switch (One Way Roller), proceed as follows: (The Solenoid Energize Switch is located under the drive arm near the right rear corner as shown in Figure 3-5.)
CAUTION
Make sure all power is OFF.

TO CHECK:
1. Move carriage to extreme right for easy access.
2. Inspect One Way Roller (see Figure 3-6). It should move freely and return under spring pressure to a position where flat surface is 60° from horizontal.
3. Open belt guard door and turn large pulley to cycle while observing action of One Way Roller. As the Actuating Arm swings to the rear, it should rotate the One Way Roller clockwise without tripping the Solenoid Energize Switch. As the Actuating Arm swings forward, a click should be heard when the Arm Roller contacts the One Way Roller and moves the Solenoid Energize Switch Arm down, tripping the Switch.

TO ADJUST:
1. Get a 11/32in. end wrench or box wrench and a screwdriver.
2. Loosen the locking nut on One Way Roller shaft and rotate the One Way Roller shaft until the roller flat is positioned from horizontal. Tighten Lock Nut.
3. Get a 3/8in. end wrench or box wrench.
4. Loosen the Locking Nut on Switch Arm and adjust Arm to horizontal position.
5. Recheck operation as described in above procedure (To Check - Step 3).

SOLENOID & RELAY RELEASE SWITCH
To adjust Solenoid & Relay Release Switch, proceed as follows: (The Solenoid Release Switch is located near Solenoid Energize Switch under right rear of drive arm as shown in Figure 3-6. Early machines have two Switches linked with a nylon bar; later models have only one Switch with double contacts.)

TO CHECK:
1. Move carriage to extreme right and open belt
2. Remove access panel from right side of drive arm with hex key wrench.
3. Position Actuating Arm in its extreme forward position by turning large pulley on top of drive arm. Measure the minimum clearance between the Actuating Arm and release Switch with a #3 shoe shim. Approximately 3/64in. (1,2mm) thick.

TO ADJUST:
1. Get a 3/8in. end wrench or box wrench.
2. Position Actuating Arm in extreme forward position.
3. Loosen locking nut on Solenoid Release Switch arm(s).
4. Rotate the arm(s) until the 3/64in. (1,2mm) clearance is obtained between Actuating Arm and Release Switch Roller or Link. Use #3 shoe shim to set this clearance.
5. Tighten Locking Nut(s) and check operation.

STROKE BOTTOM LIGHT SWITCH
To adjust Stroke Bottom (Amber) Light Switch, proceed as follows: (Stroke Bottom Light Switch is located under left rear of drive arm as shown in Figure 3-7.)

TO CHECK:
With main disconnect on and motors off, slowly turn the drive tube or hone tool in the normal direction of rotation and note the position when light flashes. The light should flash when the tool is at the bottom of its stroke.

TO ADJUST:
1. Get a hex key wrench.
2. Move carriage to extreme left of its travel.
3. hone tool to position it at bottom of stroke.
4. Loosen Setscrew that locks the Inner Adjustable Cam Ring Feed Crank (see Figure 3-8).
5. Rotate Cam Ring until Stroke Bottom Light turns on.
6. Lock Cam King to Feed Crank by tightening Setscrew.
7. Check the adjustment by manually rotating the hone tool through a cycle and noting position when light flashes. If the light does not flash as the Roller passes over the Cam, (assuming the bulb is good), adjust the position of the Switch Arm. The Switch Arm can be extended, shortened, or rotated on the Switch Shaft by loosening appropriate locking nuts (refer to Figure 3-8).

**LIFT LEVER POSITION**
To adjust Lift Lever Position, proceed as follows (see Figure 3-9):

**TO CHECK:**
1. Set stroke to maximum length (refer IOM Instructions packaged with your machine).
2. Rotate hone tool to position it at bottom of stroke.
3. With the drive arm lowered into locked down position, the Lift Lever should be in an approximate horizontal position.

**TO ADJUST:**
1. Get a 9/16in. or 14mm end wrench or box wrench.
2. Set stroke to maximum length position hone tool at bottom of stroke.
3. Loosen the two Locking Screws on adjusting flange inside carriage.
5. Check adjustments.

**LEVER SAFETY SWITCH**
To adjust Lever Switch, proceed as follows (see Figure 3-10):

**TO CHECK:**
1. Set stroke to minimum length (refer IOM Instructions packaged with your machine).
2. With the drive arm lowered into locked down position, rotate hone tool to position it at top of its stroke.
3. Push in on Clutch Control Lever to start motors. DO NOT PULL LEVER FORWARD TO ENGAGE DRIVE.
4. Slowly raise Lift Lever and note the upward movement of the spindle. The motors should turn off before the spindle moves 6mm upwards.
5. Push Stop Push Button to stop motors if Safety Switch does not stop them.

**TO ADJUST:**
1. Get a 3/16in. hex key wrench.
2. Set stroke length, drive arm, and hone tool as instructed in “To Check -Steps 1 & 2.”
3. From behind machine, loosen the Locking Screw on the Safety Switch Cam so the Cam is free to turn on its shaft.

4. Rotate the Cam into the Safety Switch roller until a click is heard (Switch opening).

5. Carefully rotate Cam forward (opposite rotation from Step 4) and lock onto shaft just as the Switch clicks (Switch closed).

6. Check adjustment.

CARRIAGE SHOE
To adjust Carriage Shoe, proceed as follows (see Figure 3-11):

**TO CHECK:**
1. The clearance between the carriage Shoe and Hail should be .004in. (0.1 mm).

**TO ADJUST:**
1. Get 9/16in. or 14 mm end wrench or box wrench.
2. Loosen Shoe Attaching Screw.
3. Adjust shoe for correct clearance and tighten screw.
4. The Roller should ride free of the machine base in the approximate center (front to back of the Rail. If necessary, the Roller can moved in or out by loosening the the roller shaft with 3/16in. Hex Key Wrench.

CARRIAGE TRAVERSING CHAIN
To adjust Carriage Traversing Chain Tension, proceed as follows (see Figure 3-12):

**TO CHECK:**
The carriage should freely through its full travel from side to side. If there is excessive play in the traverse handwheel, the chain is too loose. If the chain can be heard to "crack and pop" as the handwheel is turned, the chain is too tight.

**TO ADJUST:**
1. Get a 3/16in. or 19mm end wrench or box wrench.
2. Loosen Lock Screw.
3. Turn Adjusting Screw clockwise to tighten or counterclockwise to loosen the chain until proper tension is obtained.
4. Tighten Lock Screw.

PLANETARY GEAR
To replace Planetary Gear, proceed as follows:
1. Get a 3/4in. and 3/16in. hex key wrench.
2. Remove hone tool.
3. Loosen Set Screw in Collar in center of Feed Handwheel as shown in Figure 3-13.

**NOTE:** Catch upper feed rod as it falls through spindle.
4. Lift Feed Handwheel straight up. (There will be a slight resistance because of grease.)

5. Remove Planetary Cage from Drive Arm (see Figure 3-14).

6. Remove old Planetary Gears.

7. Carefully wash all grease and debris from the mechanism with a solvent.

8. Assemble new Gears in Planetary Cage and grease with Lubriplate "LOW-TEMP" grease or equivalent.

9. Install Cage & Planetary Gear Assembly in Drive Arm.

10. Assemble Feed Handwheel on Drive Arm making sure Ring Gear in Handwheel meshes with upper two Planetary Gears.

11. Insert Feed Rod through spindle and into Handwheel Collar. Make sure nylon flanged bushing is in place around Feed Rod at lower end of spindle.

12. Tighten Collar Set Screw onto flat on Feed Rod.

NOTE: In some cases handwheel may rotate with running spindle with only light honing load after new gears and grease have been installed. This action will stop after a short while.

GEAR REDUCER SHAFT
To replace Gear Reducer Shaft and Seal, proceed as follows (see Figure 3-15):

1. Vertical Shaft Seal
   a. Get a 5/32in. hex key wrench and 7/16in. socket wrench.
   b. Lift belt guard off.

   c. Remove Belt from Gear Reducer Pulley.
   d. Loosen Set Screw and lift Pulley off.

   NOTE: Don't loose Key.

   e. Remove four Bearing Retainer Plate screws and slide Retainer Plate up and off shaft.

   FIGURE 3-14, Planetary Gear

   FIGURE 3-15, Gear Reducer Shaft
f. Inspect shaft for nicks or burrs that might damage new seal.
g. Remove old seal from Retainer Plate.
h. Oil new seal and install in Retainer Plate.
i. Reassemble Retainer Plate to gear box.
j. Reassemble Pulley and Belt.

2. Horizontal Shaft Seal – Right
a. Get a and a hex key wrench and a end wrenches or box wrenches.
b. Drain oil.
c. Remove Stroke Release Block from Stroking Crank.

CAUTION

Drive arm will fall down.
d. Raise Pawl and slide Block forward.
e. Remove Stroking Crank from shaft.
f. Remove six Bearing Retainer Plate screws and slide Retainer Plate off shaft.
g. Inspect shaft for nicks or burrs that might damage new seal.
h. Oil new seal and install in Retainer Plate.
i. Assemble in reverse order, taking care that Stroking Crank is lined up with stroking rocker so that connecting rod is aligned without binding the bearings.
j. Fill with 600W gear oil to proper level.

3. Horizontal Shaft Seal -Left
a. Get a 7/16in. and ½in. end wrenches or box wrenches and a 5/32in. hex key wrench.
b. Drain oil.
c. Remove Feed Push Rod from left side of gearbox by removing Capscrew.
d. Loosen two Set Screws and slide both Cam Rings off Feed Crank to expose Setscrew in Feed Crank.

e. Loosen Set Screw from Feed Crank and remove Feed Crank from shaft.
f. Remove six screws and slide Bearing Retainer off shaft.
g. Inspect shaft for nicks or burrs that might damage new seal.
h. Oil new seal and install in Retainer Plate.
i. Assemble in reverse order.
j. Fill with 600W gear oil to proper level.

4. Shaft Replacement

NOTE: Don't loose Key.
b. Lift belt guard off.
c. Remove Belt from Gear Reducer Pulley.
d. Loosen Set Screw and lift Pulley off.

NOTE: Don't lose Key.

e. Remove Stroke Release Block from Stroking Crank.

CAUTION

Drive Arm will fall down.
f. Raise Pawl and slide Block forward.
g. Remove Stroking Crank from shaft.
h. Remove Feed Push Rod from left side of gearbox by removing Cap Screw.
i. Loosen Two Set Screws and slide both Cam Rings off Feed Crank to expose Set Screw in Feed Crank.
j. Loosen Set Screw from Feed Crank and remove Feed Crank from shaft.
k. Remove four Mounting Bolts and remove gearbox.
l. Drain oil.
m. Horizontal shaft can be removed from either side by removing one Bearing Retainer Plate.
n. Inspect inside of gear box for broken shaft parts or other debris.
o. Install new shaft.
p. Assemble in reverse order.
q. Fill with gear oil to proper level.

TIMING BELT

To adjust Timing Belt, proceed as follows (see Figure 3-16):

TO CHECK:
1. Push against the Timing Belt as shown with finger pressure. The Timing Belt should deflect no more than ¼in. (6mm).
2. Check for missing teeth.
TO ADJUST:
1. Get a 9/16in. and a ¾in. socket wrench.
2. Loosen Timing Belt Idler Arm.
3. Loosen Back Stop for Idler Arm.
4. Rotate Back Stop into Idler Arm to increase belt tension.
5. Tighten Back Stop and Idler Arm.

TO REPLACE:
1. Get a ½in. end wrench and 9/16in. and ¾in. socket wrenches.
2. Remove Feed Push Rod from Feed Crank by removing Capscrew (see Figure 3-17).

NOTE: Do not move Lock Nut; it would disturb the length setting of Feed Push Rod.
3. Loosen Idler Arm and Back Stop (refer to Figure 3-16).
4. Remove Timing Belt
5. Install new Belt and tension Belt as described in “To Adjust”.
6. Reconnect Feed Push Rod to Feed Crank.

STROKE RELEASE PAWL
To adjust Stroke Release Pawl, proceed as follows (see Figure 3-18):

TO CHECK:
1. Get .004in. (0.1mm) feeler gage.
3. With Drive Arm positioned at bottom of stroke, measure clearance between Stroke Release Pawl and Connecting Rod as shown in Figure 25. Clearance should not exceed .004in. (0.1 mm).

TO ADJUST:
1. Get ¾in. or a 19mm and a 7/8in. end wrench.
2. Loosen two Nuts on threaded of Connecting Rod.
3. Adjust Large Nut until Pawl and Connecting Rod have .004in. (0.1mm) maximum clearance.
4. Tighten Nuts.
5. Check adjustment.

VARIABLE FEED RATCHET
To adjust Variable Feed Ratchet, proceed as follows (see Figure 3-19):

TO CHECK:
1. Turn power off.
2. Set Variable Feed to 9.
3. Manually rotate hone tool and count the number of "clicks" the ratchet makes.

4. The number of clicks should be the same as the setting on the variable feed. Example: Feed set at 9 should produce nine clicks.

**TO ADJUST:**
1. Get ½in. end wrench.
2. Loosen Lock Nut on Gear Box End of Feed Push Rod.
3. Rotate Feed Push Rod to adjust length for correct number of clicks.

**NOTE:** Shortening Rod will increase the number of clicks.

4. Tighten Lock Nut.
5. Check at feed settings 1 and 9.

---

**FEED OVERLOAD SPRING**
To adjust Feed Overload Spring, proceed as follows (see Figure 3-20):

**TO CHECK:**
Measure length of the spring on the feed push rod. It should be 3.5in. (89mm).

**TO ADJUST:**
1. Get two ½in. wrenches and a scale.
2. Loosen Lock Nuts on forward end of Push Rod.
3. Adjust Nuts until compressed spring is long.
4. Tighten Lock Nuts.

---

**FEED HANDWHEEL SWITCH**
To adjust Feed Handwheel Switch, proceed as follows (see Figure 3-21): (The Feed Handwheel Limit Switch is located behind and to the of the Feed Handwheel.)

**NOTE:** It is possible for the machine to continue honing for one stroke after zero is reached and the Feed Limit Switch is tripped. This is because there are two events which take place as the machine reaches zero and turns off. First, the Feed Handwheel Switch is tripped. Next, the Cycle Stop Switch turns off motors as the drive arm reaches the top dead center position. If the Feed Handwheel Limit Switch trips as the drive arm passed top dead center, the machine will make one full stroke before it turns off. Also, if the feed pawls are advancing the Feed wheel and the Drive Arm is passing the top dead center position as zero is reached, the machine will continue to feed and hone for one stroke. The machine stops, it will have fed past zero.

**TO CHECK:**
Rotate Feed Handwheel to position the “0” to the right of the pointer. Slowly turn Feed Handwheel to bring the “0” over the pointer. Stop the Feed Handwheel when the Limit switch clicks. Pointer should rest on “0.”

**TO ADJUST:**
1. Get a 3/8in. end wrench or box wrench and a small screwdriver.
2. Loosen the Pinch Clamp Nut that holds the Roller Arm to the Switch Shaft.
3. Set feed dial to “0.”
4. Place Switch Arm Roller against Shutoff Tab.
5. Rotate the Switch Shaft with screwdriver until the Switch clicks.
6. Tighten Pinch Clamp and check adjustment.
CYCLE STOP SWITCH
The Cycle Stop Switch is located under the left side of the drive arm (see Figure 3-22). There are two switch arms. The upper switch arm is for the Cycle Stop Switch. To adjust, proceed as follows:

TO CHECK:
The cycle stop switch causes the machine to turn off the next time the drive arm reaches the top of its stroke after the handwheel has reached "0." The exact position of the drive arm will vary according to honing load, stroking speed and the tooling being used.

TO ADJUST:
1. Get a 5/32in. Hex Key Wrench.
2. Move carriage to extreme left of its travel.
3. Loosen set screw that locks the outer adjustable cam ring to feed crank.
4. Rotate cam ring to adjust point at which machine turns off.

NOTE: Rotating the ring clockwise will cause the machine to turn off if the drive arm consistently comes to rest at a point after top dead center the cam ring should be turned clockwise.
5. Tighten set screw and check adjustment while honing.

CLUTCH MECHANISM
The clutch mechanism is located on top of the drive arm. As one adjustment affects the others, make the adjustments in the order given:
1. Get two 1/2in. and one 9/16in. end wrenches and a scale.
2. Turn all power off.
3. With clutch lever in "AT REST" position, adjust clutch spring to a length of 2in.
4. Pull Clutch Control Lever all the way forward. Check that Clutch Idler Pulley is clutching spindle belt (see Figure 3-24).

5. Adjust Clutch Stop to provide ½ in. (13 mm) clearance (see Figure 3-23).

6. Push Clutch Control Lever to "AT REST" position. Loosen Lock Nut and adjust Clutch Adjusting Nut to provide 1/16 to 3/16 in. (1.5–4.5 mm) clearance between Handwheel teeth and Feed Pawls. Rotate feed ratchet (under drive arm) to check Pawl clearance in all Pawl positions. Tighten Lock Nut (refer to Figure 3-24).

7. Adjust Clutch Rod to obtain 3 mm clearance between Clutch Control Lever and Stop Sleeve while Clutch Lever is still in "At Rest" position.

8. Adjust Switch Actuating Screw to actuate Start Switch when Clutch Control Lever is 1/32 in.

(0.8 mm) away from Stop Sleeve.

9. Adjust Stop Collar to compress spring to 1 in. (25 mm). This prevents Start Switch from being actuated when Clutch Control is rapidly released.

**MULTIPLE DWELL CONTROL CAM POSITION**
(Not applicable to all models) To adjust Multiple Dwell Control Cam Position, proceed as follows:

**TO CHECK:**
1. Turn on main disconnect.

**CAUTION**

**DO NOT START MOTORS.**

2. Set red pointer to

3. Set Dwell Control to "single."

4. Turn Multiple Dwell Control to 15, and release it.

5. The knob should return to zero.

**TO ADJUST:**
1. Loosen the two (2) set screws that lock the knob to the shaft.

2. Turn the knob to align it with zero.

3. Tighten the set screws and check the adjustment.

If the knob stopped before reaching zero or if the above adjustment does not allow the Multiple Dwell Control to function over its entire range, the cams need to be adjusted as follows:

1. Turn all power off.

2. Open door of the Remote Control Panel.

3. Loosen the set screws on timer cams and position cams so the switch roller is held up for positions of the knob except zero. There are two cams that overlap in order to hold the switch up for the full 270° of knob rotation.

**SOLENOID PLUNGER GUIDE**
The Solenoid is located near the left rear (facing machine) of the drive arm. To replace, proceed as follows (see Figure 3-25):

**TO REPLACE:**
1. Get a 5/32 in. Hex Key Wrench, screwdriver, two (2) 1-5/8 inch and one 7/16 inch end wrenches.

2. Remove two (2) 7/16 in. cap screws, from shock absorber plate remove shock absorber plate (see Figure 3-26).

3. Remove six (6) screws cover and gasket (see Figure 3-27).

4. Remove clevis pin from plunger (refer to Figure 2-27).

5. Remove retaining ring, washer and spring.
6. Remove solenoid plunger.
7. Remove nut and lockwasher.
8. Replace plunger guide.
9. Assemble in reverse order.

**SETTING GAGE CALIBRATION**

To check Setting Gage, proceed as follows (see Figure 3-28):

1. CK-3155 (Range 2.4 to 5in. (61-127mm))
   a. Set turret for “Standard” position and retighten eliminating Recheck setting gage as graduated slide to “0.”
   b. Set a micrometer to 2in. (51mm).
   c. Adjust setting gage rollers to 2in. (51mm) outside . . . (measure as close to gage body as practical).
   d. Move graduated slide until pin contacts turret.
   e. If setting gage is properly calibrated, indicated reading on graduated slide will be between 8 and 9.
   f. If reading is not correct check adjusting screw “end play.” If any movement is present, loosen adjusting knob and retighten eliminating “end play.” Recheck setting gage as above.
   g. If reading is incorrect and no end play is present, contact Sunnen Products Company Sales Department for instructions.

2. CK-4155 (Range 4 to 6in. (102-152mm))
   a. Set graduated slide to
   b. Set a micrometer to 3in. (76mm).
   c. Adjust setting gage rollers to 3in. (76mm) outside. (Measure as close to gage body as practical.)
   d. Move graduated slide until pin contacts movable block.
   e. If setting gage is properly calibrated, indicated reading on graduated slide will be between 9 and 10.5.
   f. If reading is not correct check adjusting screw in end play”. If any movement is present, loosen adjusting knob and
   g. If reading is incorrect and no end play is present, contact Sunnen Products Company Sales Department for instructions.
Like any machinery, this equipment may be dangerous if used improperly. Be sure to read and follow instructions for operation of equipment.
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FORMULAS:

1. Multiply INCHES (in) by 25.4 = MILLIMETERS (mm)
2. Multiply FEET (ft) by 0.3048 = METERS (m)

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